

Fluorinated Pesticides

Clint Richmond,

Dec. 14, 2021



MASSACHUSETTS
SIERRA CLUB

Overview

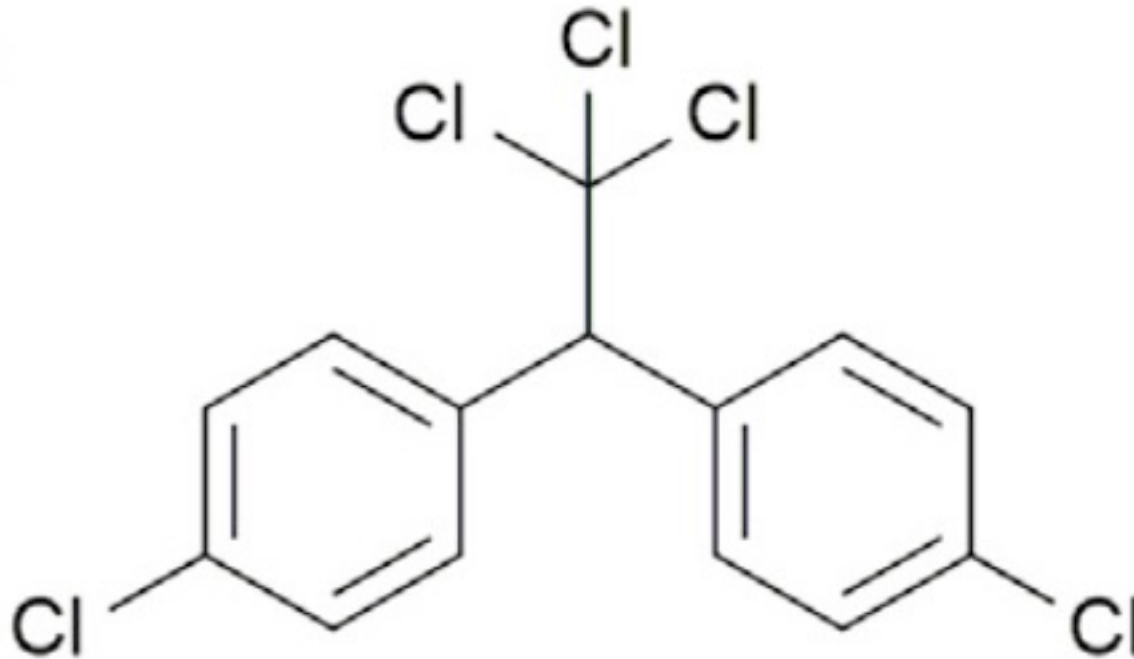
- Introduction
- Fluorinated hydrocarbons
- Definitions of PFAS
- Pyrethroids
- Conclusion

PFAS in Pesticides

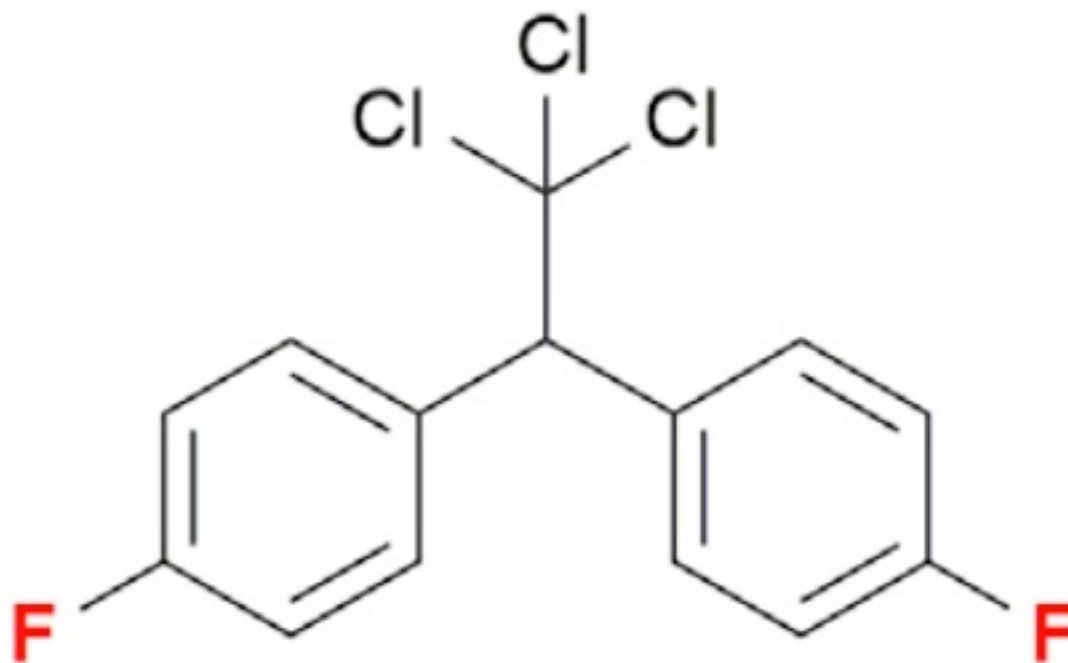
3 sources:

- Active ingredients
- Inert ingredients
- Packaging or equipment

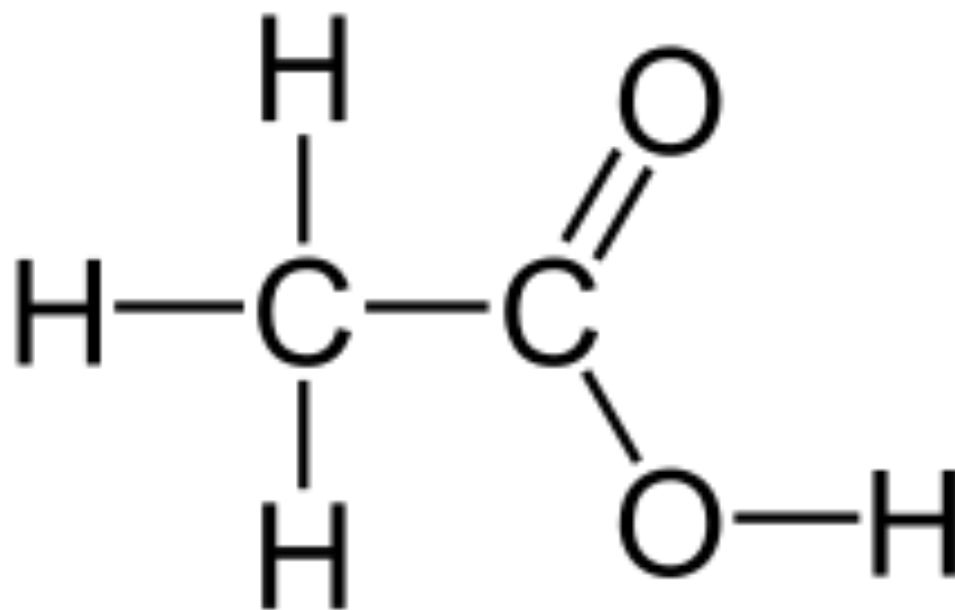
DDT – 1939 (Chlorinated Hydrocarbon)



Fluorinated DDT (DFDT) – 1945

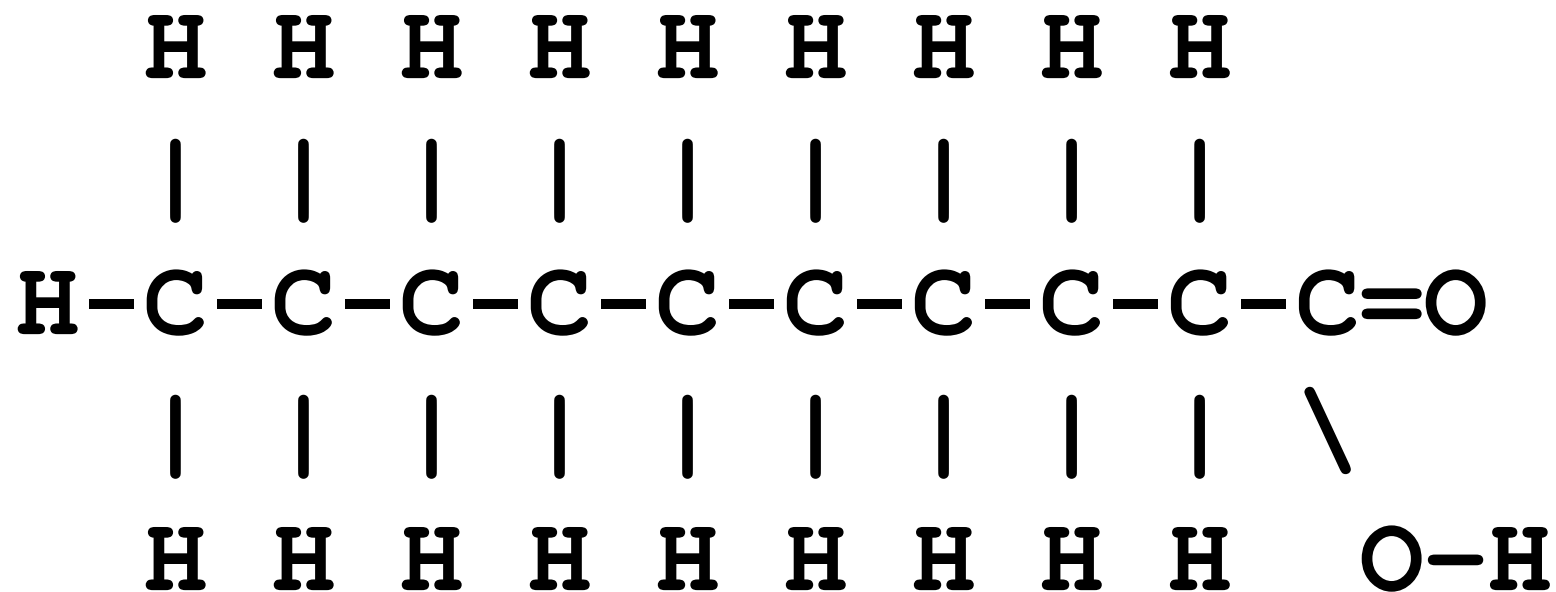


Hydrocarbons: Acetic Acid

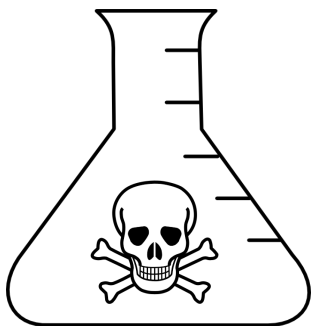
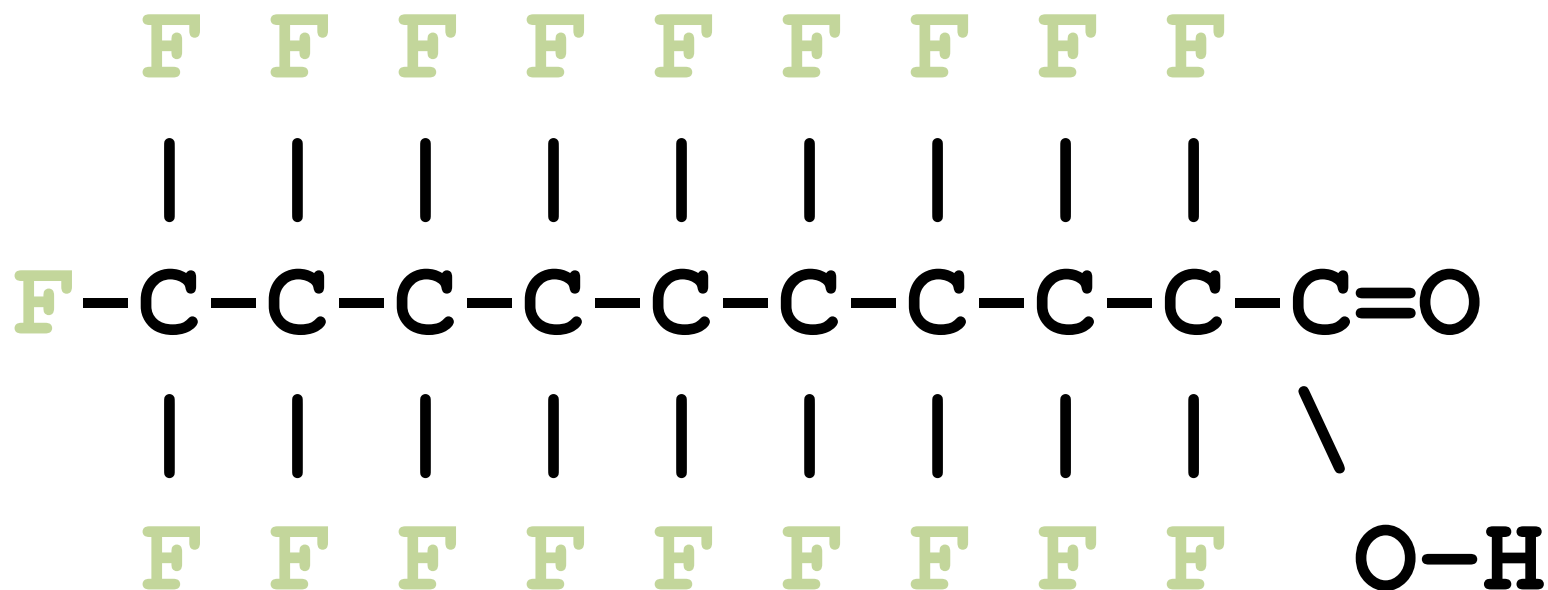


Hydrocarbons:

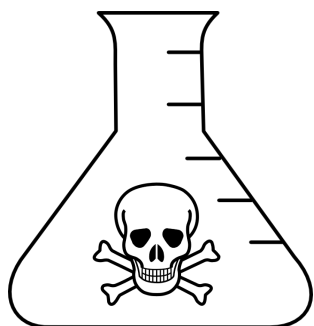
Octanoic Acid



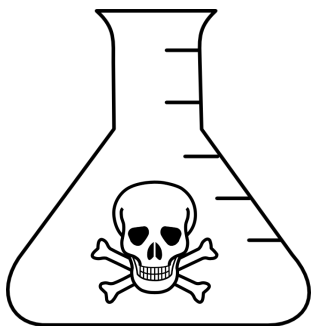
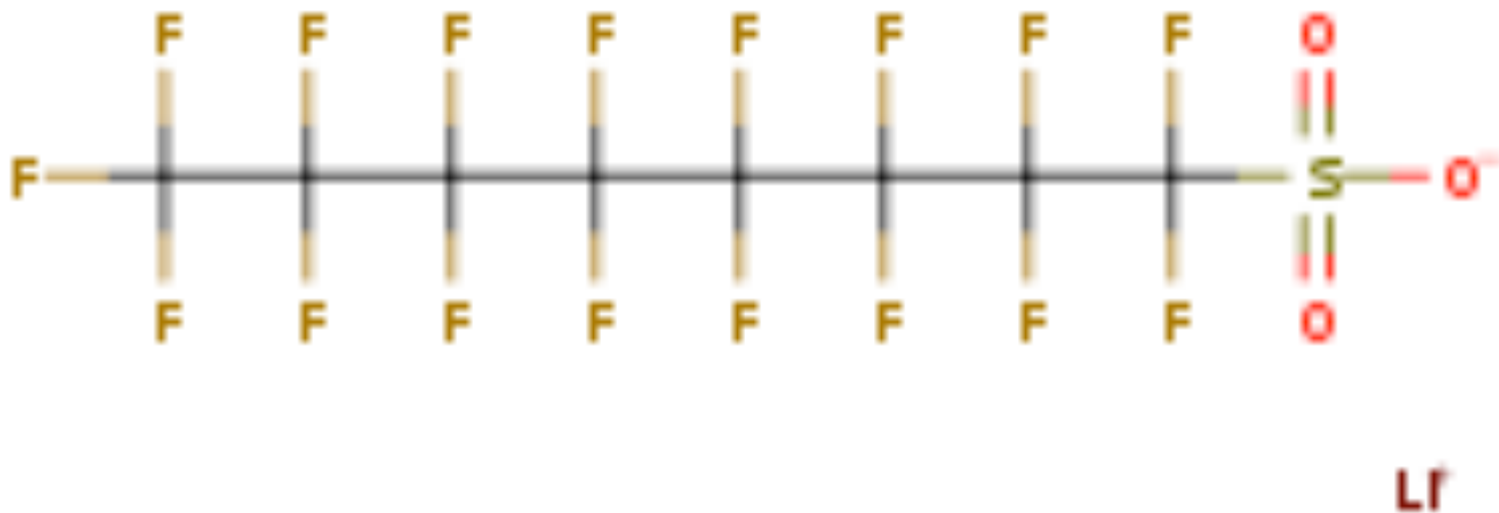
Fluorinated Hydrocarbons: Perfluoro Octanoic Acid (PFOA)



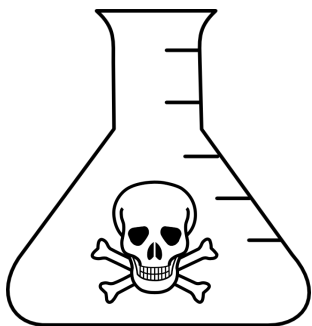
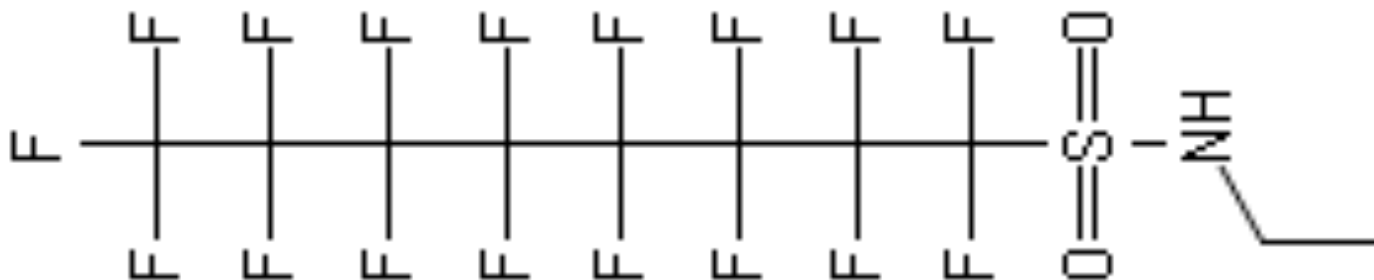
Fluorinated Hydrocarbons: Perfluorooctanesulfonic acid (PFOS)



Fluorinated Hydrocarbons: Lithium perfluorooctanesulfonate (LPOS)



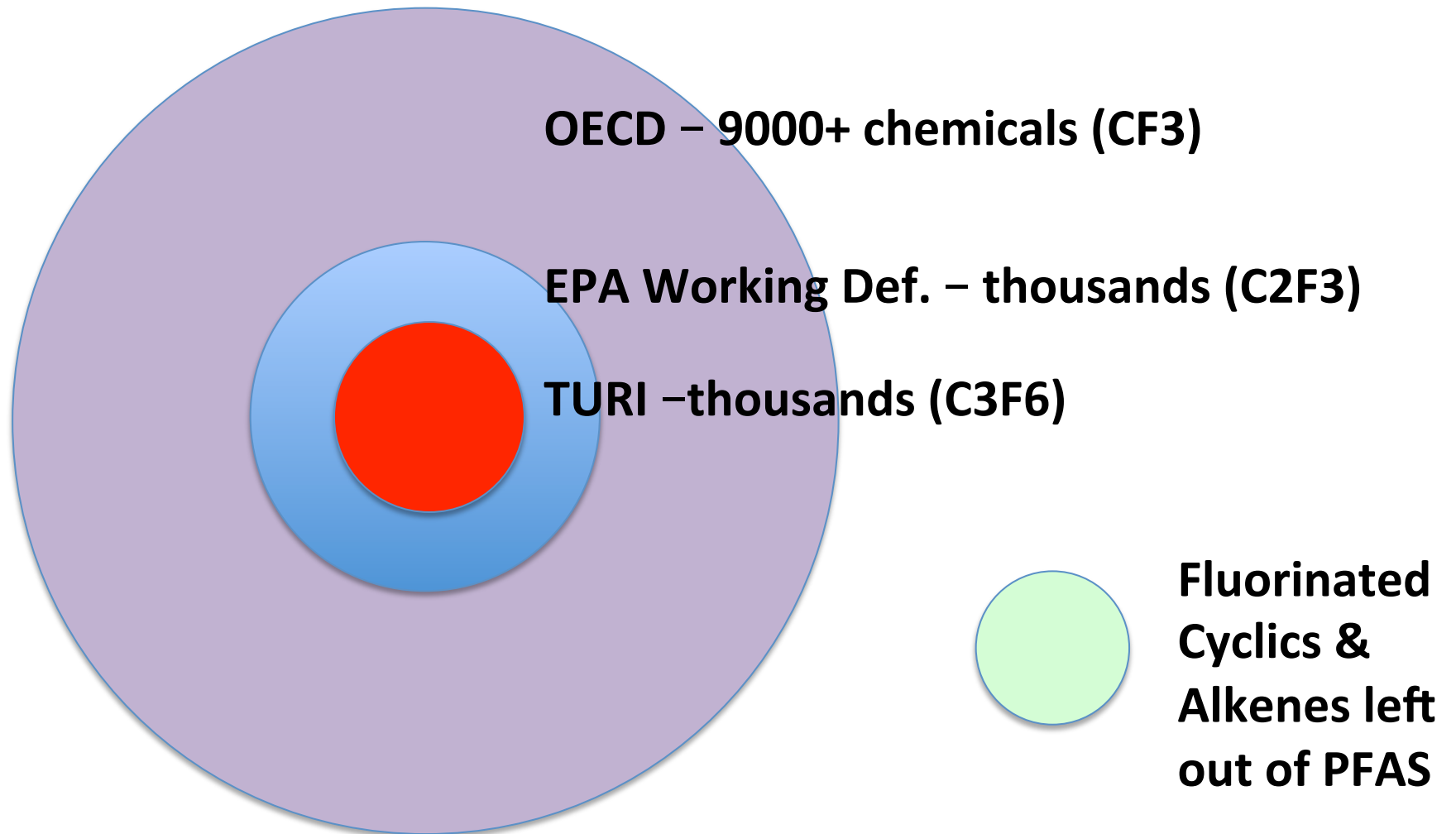
Fluorinated Hydrocarbons: Sulfluramid - insecticide



Fluorinated Hydrocarbon Pesticides

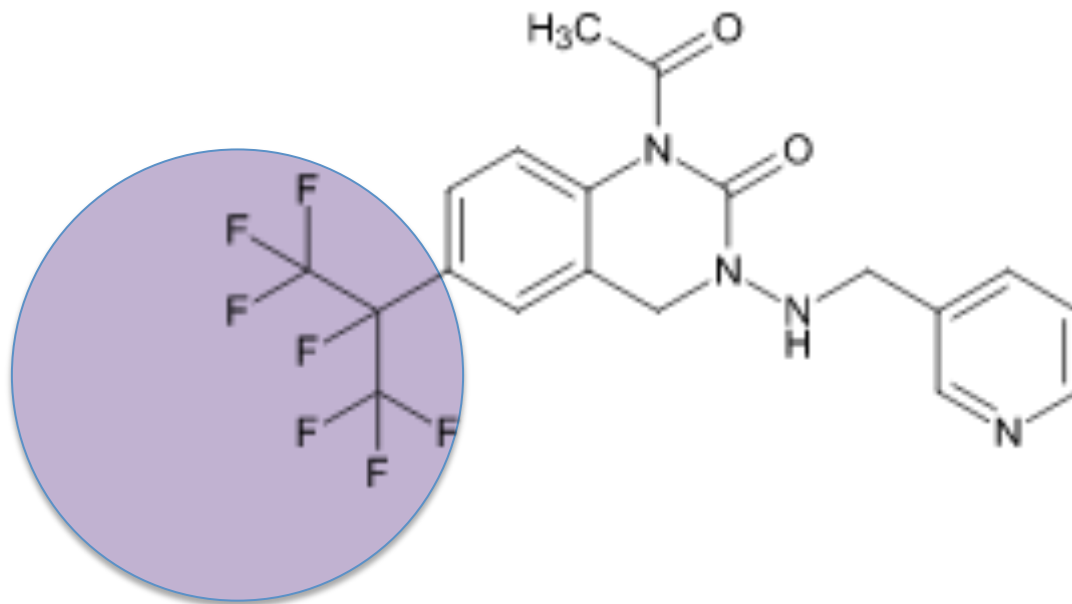
- Fluorinated = at least 1 C–F
- 87 fluorinated ingredients approved in Mass.
 - 7% of the roughly 1200 total active pesticide ingredients in Mass.
 - Used in over 2100 products approved in Mass.
 - 76 are polyfluorinated (2 F in the compound)
 - All but one have multiple fluorines in a single structure
 - This total does not include past chemicals such as DFDT, LPOS or Sulfluramid

PFAS Definitions



EPA Definition PFAS Pesticides

- Pyrifluquinazon – approved in Mass.



- Broflanilide – not approved in Mass.

Pyrethroids

25 Common Pyrethroids

Allethrin

Bifenthrin

Cyfluthrin

Cypermethrin

Cyphenothrin

Deltamethrin

Esfenvalerate

Etofenprox – Zenivex

Fenpropathrin

Fenvalerate

Flucythrinate

Flumethrin

Imiprothrin

lambda-Cyhalothrin

Metofluthrin

Permethrin

Phenothrin (Sumithrin) – Anvil
& Duet

Prallethrin - Duet

Resmethrin

Silafluofen

tau-Fluvalinate

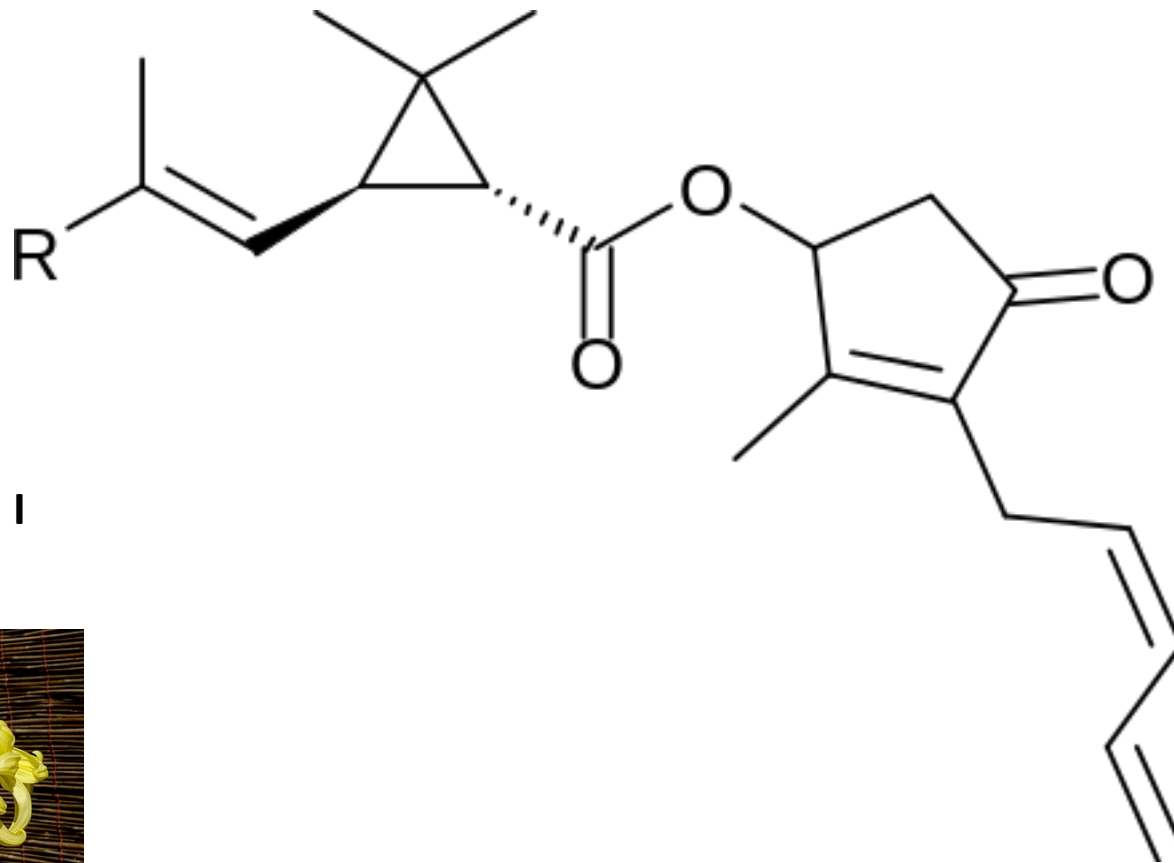
Tefluthrin

Tetramethrin

Tralomethrin

Transfluthrin

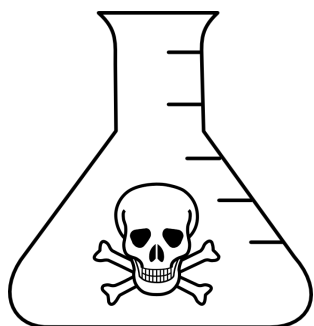
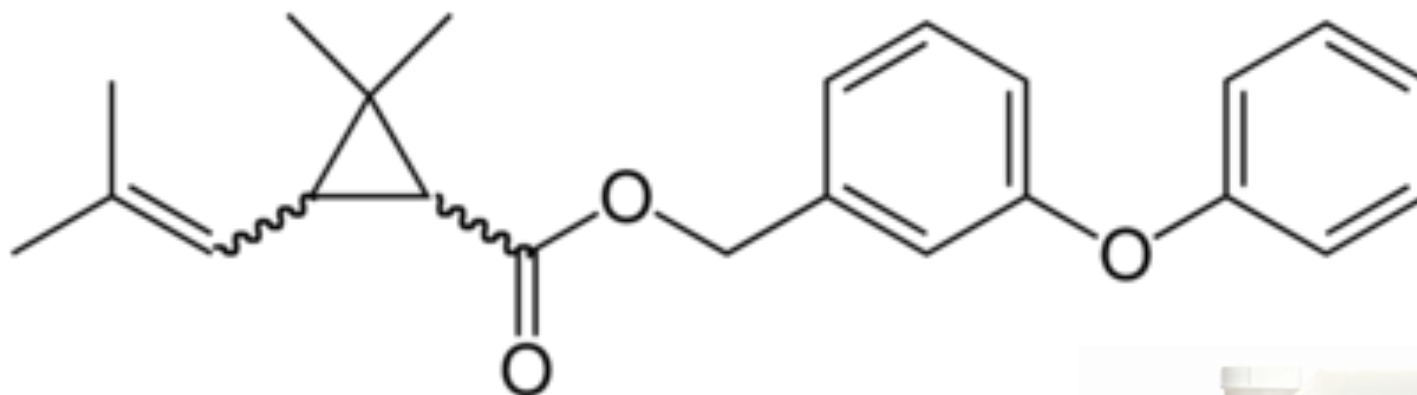
Pyrethrum/Pyrethrins



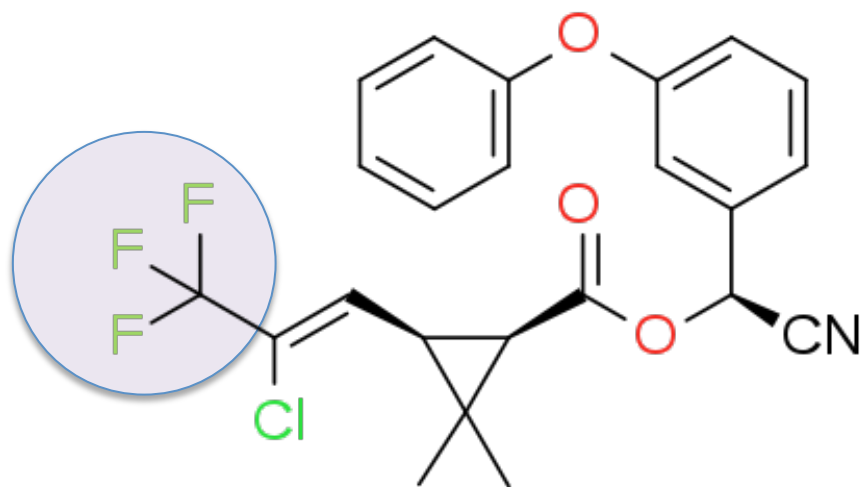
Pyrethrin I



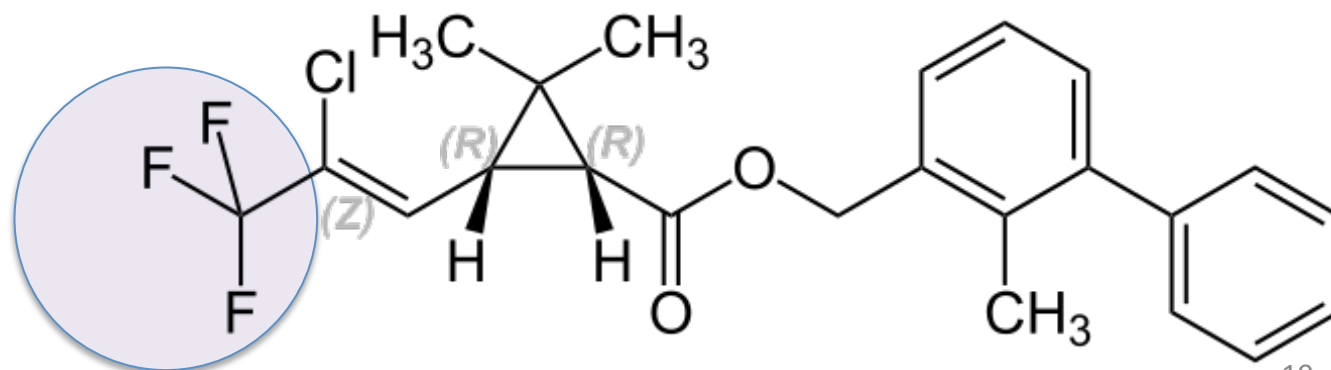
Phenothrin / Sumithrin®



Pyrethroids that meet the OECD PFAS definition but not EPA

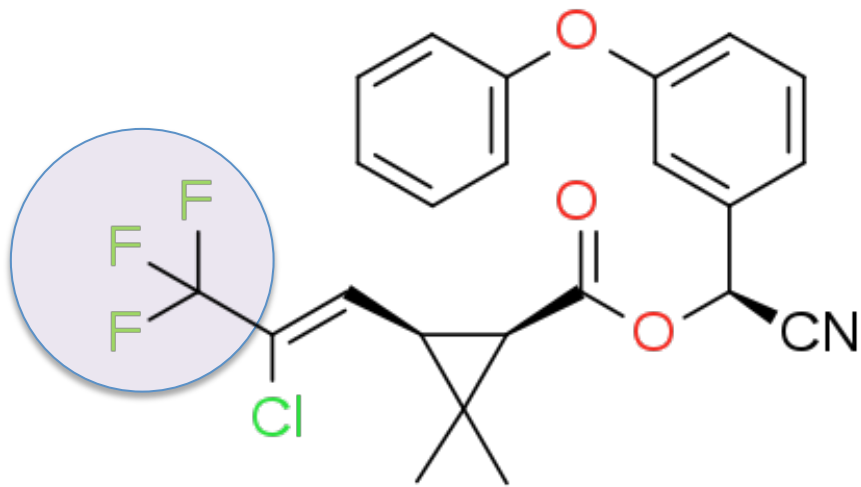


Cyhalothrin

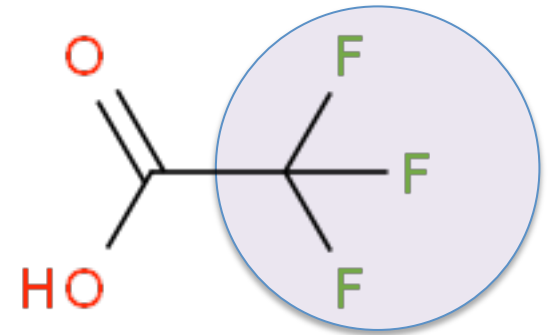
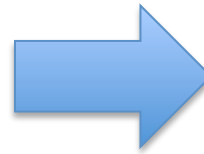


Bifenthrin

Pyrethroids can degrade into PFAS

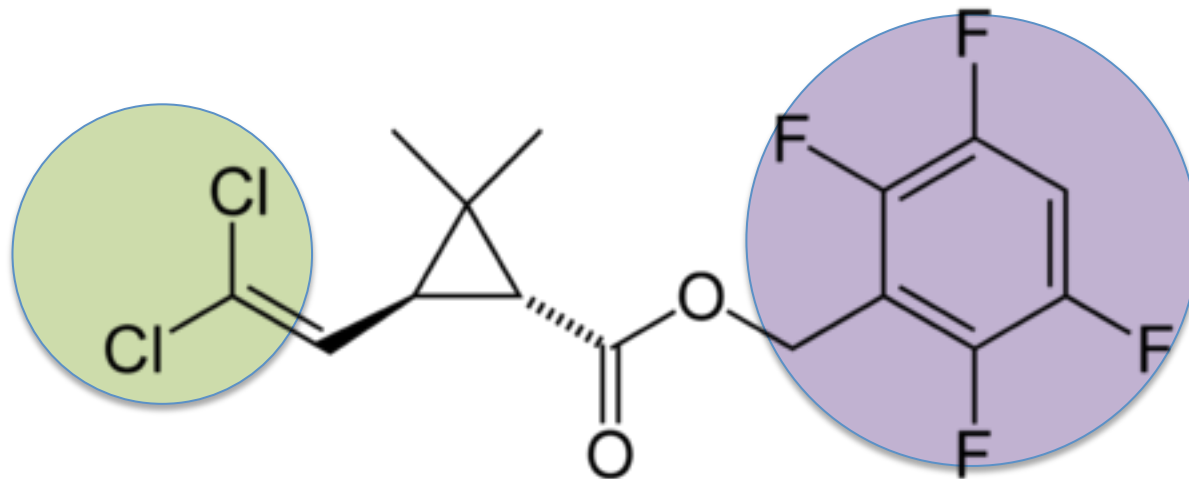


Cyhalothrin



Trifluoroacetic acid

Transfluthrin: Does *not* meet OECD or EPA Definition



Conclusions

- C–F is the strongest bond in organic chemistry
- This leads to extreme persistence which is why PFAS is called the “Forever Chemical”
- PFAS are also highly mobile, so toxicologists call it “vPvM” which makes them **all** environmental chemicals of concern
- The state and the country are suffering from extensive PFAS contamination.
- Our goal needs to be the elimination of these synthetic pollutants.
- If we ban the 87 fluorinated products we still have over 1000 left.